Attachment E

APPENDIX A

STATEMENT OF WORK
"Solar Decathlon 2013"

July 8, 2011

1.0 BACKGROUND

The U.S. Department of Energy Solar Decathlon (Solar Decathlon) challenges 20 collegiate teams to design, build, and operate solar-powered houses that are cost-effective, energy-efficient, and attractive. The winner of the competition is the team that best blends cost-effectiveness, consumer appeal, and design excellence with optimal energy production and maximum efficiency.

Solar Decathlon houses are modular structures with nominal 600 ft^2 (55.7 m^2) to 1000 ft^2 (92.9 m^2) finished floor areas as measured by ANSI Z765-2003. Permanent foundations are prohibited and the houses' temporary foundations shall not disturb the ground on which they rest. The energy source for the houses is limited to the global solar radiation incident on each house's site.

The next Solar Decathlon (SD2013) will take place in fall 2013. The location for this event will be within the continental United States at a location to be determined at a later date. It is expected that the location will be announced prior to the proposal due date. Five previous competitions have been held between 2002 and 2011. See http://www.solardecathlon.gov for information about previous competitions. The Solar Decathlon 2011 Rules will be the basis for the 2013 rules and will be revised after the 2011 event. The most recent versions of the 2011 competition Rules and Building Code documents are posted on the Rules page of the Solar Decathlon Web site.

Depending on the availability of funds and the outcome of the 2011 competition, the Department of Energy intends to make the following significant rule changes:

- The competition will incorporate transportation as a separate contest wherein teams will be required to drive an electric vehicle for a certain number of miles to earn points. The structure of this contest will be determined after the conclusion of the 2011 competition. To accommodate the inclusion of a transportation contest, the points among the remaining contests will be reallocated.
- It is possible that the U.S. Department of Energy Solar Decathlon 2013 will be held outside of Washington, D.C. It is expected that the location for Solar Decathlon 2013 will be announced prior to the proposal due date.

The above list of proposed rule changes is not exhaustive and is subject to change.

Participating teams are required to produce several project deliverables in the two years preceding the competition. Details are provided in Section 6.0.

2.0 OBJECTIVE

The Solar Decathlon is a research and demonstration project that adopts the U.S. Department of Energy Building America Program's primary objective to "accelerate the development and adoption of advanced building energy technology in new and existing homes." The Rules are designed to reward teams that successfully **demonstrate advanced building energy technologies** within the framework of the ten Solar Decathlon contests. Section III in the Solar Decathlon 2011 Rules contains details about the contests. Note, however, that the Rules are revised for each competition and specific contests may change.

Because the Solar Decathlon is a demonstration project culminating in a public competition, teams are also rewarded for **conducting outreach activities** in parallel with the competition.

Finally, it is important to note that participation of hundreds of engineering, architecture, business, and communications students in this fully realized, design-build project makes Solar Decathlon a unique and effective U.S. Department of Energy **workforce development** program. In addition, the incorporation of the Solar Decathlon competition into university curriculums serves to extend the Building Sciences programs at associated universities.

3.0 SCOPE OF WORK

The challenge to the teams competing in SD2013 is to safely and effectively design, build, and operate solar-powered houses that are cost-effective, energy-efficient, and attractive in less than 24 months. The winner of the competition is the team that best blends affordability, consumer appeal, and design excellence with optimal energy production and maximum efficiency. On time completion of the design and documentation is required to meet deliverable requirements and typical construction timelines, and will leave enough time to conduct tests of the assembly, operation, and disassembly competition phases during the summer preceding the competition. It is critical that high quality and complete design documentation is provided on time to enable successful review of designs and distribution of feedback in a timeline appropriate for academic and construction schedules.

The biggest non-financial challenges are typically 1) achieving full cooperation among students, faculty, and staff from many university departments and offices; and 2) completing design development and construction documentation on time.

4.0 TASKS

Many of the tasks outlined below must be conducted in parallel in order to meet project deadlines.

4.1 Fundraising (ongoing)

Fundraising typically continues for the duration of the project unless the team manages to identify a large donor before or during the project.

4.2 Curriculum Development (summer/fall 2011)

Due to academic calendar constraints and deadlines, schools planning to submit a proposal should begin curriculum planning and class scheduling before receiving notification of their selection.

4.3 Team Development (summer/fall 2011)

A core group of students committed to the project should have a significant role in the proposal-writing process. Student team leaders and a faculty advisor should try to attend some or all of the 2011 competition.

4.4 Schematic Designs (winter 2011/spring 2012)

At the conclusion of the schematic design phase, all questions about the project should be identified and general concepts should be refined to represent all aspects of the ultimate design.

4.5 Design Development (summer/fall 2012)

In the design development phase, decisions made in schematic design are worked out at a more detailed level to minimize the possibility of major modifications being needed during the development of construction documents. In design development, the design team works out a clear, coordinated description of all aspects of the design, including architectural, mechanical, electrical, plumbing, and fire protection systems. The approved design development documents provide the basis for the construction documentation phase, which sets forth in detail the requirements for construction.

4.6 Construction Documentation (fall 2012/winter 2013)

Once a design has been developed and approved, the team prepares the drawings and project manual that set forth the requirements for construction. The development of the construction documents is an extension of the design process. Decisions on details, materials, products, and finishes all serve to reinforce the design concept—and begin the process of translating the concept into reality.

4.7 Construction (spring/summer 2013)

Construction typically takes place on or near the school's campus during the 6-8 month period preceding the competition.

4.8 Testing/Commissioning (summer 2013)

Teams completing construction by the end of spring 2013 will have an opportunity to thoroughly test their assembly and disassembly procedures and house systems during summer 2013. Teams that successfully complete house testing and commissioning prior to the competition should have a significant advantage in the competition.

4.9 Transportation (late summer/early fall 2013)

Depending on the distance, terrain, and border crossings between the construction site and the competition site, house transportation may begin as early as two months prior to the competition.

4.10 Assembly (early fall 2013)

The assembly phase is the period of time between the arrival of trucks and the beginning of contests on the competition site.

4.11 Contests and Public Exhibit (early fall 2013)

The contests and public exhibit are conducted during a 10-12 day period on the competition site.

4.12 Disassembly (early fall 2013)

The disassembly phase is the period of time between the closing of the public exhibit and the completion of competition site cleanup.

4.13 Project Closeout (fall 2013)

Project closeout tasks vary widely from team to team and usually depend on the disposition of the house after the competition.

5.0 REVIEW MEETINGS

The following review meetings will take place during the period of performance (all dates are tentative):

- January 25, 2012: Orientation teleconference
- May 19, 2012: Schematic Design Review Workshop (Location TBD)
- January 19, 2013: Design Development Review Workshop (the International Builders' Show in Las Vegas, NV is the probable location)
- March 2012 – September 2013: Monthly teleconferences (typically at 1 p.m. Mountain time on the first Wednesday of the month)

In addition to the review meetings listed above, meetings may be arranged with individual teams at various times throughout the period of performance.

6.0 DELIVERABLES

Due Date	Payment	Deliverable Name		Format	Comments
PHASE I ($50k total)					
August 19, 2012	5%	Web Site		URL	• Must be code* compliant • Corrections and resubmittal due 14 days after receipt of reviewer comments
October 11, 2012	35%	Design Development Phase	Building Information Model	RVT (Revit)*	• Minimum 80% complete design documentation • Corrections and resubmittal due 14 days after receipt of reviewer comments
			Drawings	PDF	
			Project Manual	PDF	
December 21, 2012	5%	Computer-Animated Walkthrough		MOV (Quicktime)	• Corrections and resubmittal due 14 days after receipt of reviewer comments
January 19, 2013	5%	Scale Model		1:24 Model	• Must be submitted by one or more student team members at the Design Development Review Workshop
PHASE II ($50k total)					
February 12, 2013	5%	Health and Safety Plan		PDF	• Includes Project Manager's, Construction Manager's and Health and Safety Officer's proof of recent OSHA 30-hour construction safety training • Corrections and resubmittal due 14 days after receipt of reviewer comments
	25%	Construction Documentation Phase	Building Information Model	RVT (Revit)**	• Minimum 95% complete design documentation • Must demonstrate code* compliance and reflect final design • Corrections and resubmittal due 14 days after receipt of reviewer comments
			Drawings	PDF	
			Project Manual	PDF	
April 25, 2013	5%	Project Summary		PDF	• Corrections and resubmittal due 14 days after receipt of reviewer comments
June 27, 2013	5%	Public Exhibit Materials		PDF	• Corrections and resubmittal due 14 days after receipt of reviewer comments
No later than November 22, 2013	5%	Disassembly		n/a	• Safe disassembly of the project and complete, on-time removal of all equipment and project components from the competition site
November 22, 2013	5%	Final Report		PDF	• Corrections and resubmittal due 14 days after receipt of reviewer comments

*** The Solar Decathlon 2011 Rules and Building Code describe the codes for the 2011 event. It is likely the codes will be similar for the 2013 event.**

**** The building information model shall be submitted as an Autodesk Revit file. Teams shall coordinate any training needs directly with the software providers. NREL is not responsible for providing or coordinating software training.**

7.0 ELECTRONIC REPORTING REQUIREMENTS FOR DELIVERABLES

As set forth in Department of Energy Order 241.1A, NREL is required to submit in an electronic format all scientific and technical information, including subcontract report deliverables intended for public distribution, to the DOE Office of Scientific and Technical Information (OSTI). In addition, it is NREL's intention to post subcontract report deliverables containing publicly available information (e.g. non-confidential, non-protected, non-proprietary information) for distribution on the NREL Intranet or the Internet.

The Subcontractor shall provide the final approved version of report deliverables intended for public distribution as specified in the deliverables schedule of this Statement of Work in accordance with the following electronic reporting requirements:

a. The Subcontractor shall submit all report deliverables intended for public distribution (including status, annual, or final reports) as electronic files with all graphics and images embedded within the document.

b. All final approved version submissions shall be delivered to NREL by uploading the files to the SD Dropbox. Files of 5 Mb or less can be sent via e-mail to the NREL Technical Monitor.

c. The required file format for each respective deliverable is specified in the table in Section 6.0.

d. A fully executed release shall be supplied to NREL with all photographs, regardless of whether such photographs are delivered to NREL electronically or in hard copy. Such release shall certify that the National Renewable Energy Laboratory and the United States Government is granted a non-exclusive, paid-up, irrevocable, worldwide license to publish such photographs in any medium or reproduce such photographs or allow others to do so for United States Government purposes.

e. The Subcontractor may contact NREL Publication Services at (303) 275-3648 with questions regarding technical guidance concerning the submission of subcontract report deliverables as electronic files or exceptions to electronic files for graphics and images.